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# TECHNICAL SPECIFICATION

## Simulators used for testing of photovoltaic power conversion equipment – Recommendations – Part 1: AC power simulators

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# SIMULATORS USED FOR TESTING OF PHOTOVOLTAIC POWER CONVERSION EQUIPMENT – RECOMMENDATIONS –

## Part 1: AC power simulators

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical Specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 63106-1, which is a Technical Specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this Technical Specifications based on the following documents:

| Draft TS | Report on voting |
|---|---|
| 82/1731/DTS | 82/1776A/RVDTS |

Full information on the voting for the approval of this Technical Specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 63106 series, published under the general title *Simulators used for testing of photovoltaic power conversion equipment – Recommendations*, can be found on the IEC web site.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

# INTRODUCTION

The objective of this document is to establish terminology, and create a framework for, and provide guidance regarding the electrical performance of AC power simulators used to test utility interactive photovoltaic (PV) power conversion equipment (PCE) for compliance with grid interconnection standards.

It serves as a generalized guideline for the development of AC power simulators used within a test and evaluation system for PV PCEs.

Testing laboratories are responsible for selecting the appropriate test items and procedures as well as defining the required performance for adequate evaluation of utility interactive PV PCEs, considering utility power requirements, local codes and regulations.

Utility interactive PCEs are used not only for PV, but also for various distributed generation technologies such as wind power, battery energy storage, engine co-generation or fuel cells. Some of the recommendations in this document may be similar and applicable for AC simulators used to test these other generation technologies, but they are not intended to supersede testing requirements found in related IEC standards.

This document may be used in conjunction with regional or national grid standards and codes, such as:

a) European level utility interaction requirements such as:

   EN 50549-1:2019,

   EN 50549-2:2019.

b) German FGW TG3.

c) UL1741 supplement SA, SRD-UL-1741-SA-V1.1.

d) IEEE 1547-2003, IEEE1547a (Amendment 1) -2014 and IEEE1547.1-2005.

e) IEEE 1547-2018 and IEEE 1547.1-2020.

# SIMULATORS USED FOR TESTING OF PHOTOVOLTAIC POWER CONVERSION EQUIPMENT – RECOMMENDATIONS –

## Part 1: AC power simulators

## 1 Scope

The purpose of this part of IEC 63106 is to provide recommendations for Low Voltage (LV) AC power simulators used for testing utility interactive photovoltaic power conversion equipment (PCE).

NOTE Low Voltage refers to 1 000 Va.c. and less.

The AC power simulators connect to the AC output power port of a PCE under test and simulate the utility grid by generating comparable AC voltage.

The AC power simulators can be used to test a PCE's utility interaction characteristics, including protection, ride through, immunity and power quality. The requirements and procedures are specified in IEC standards and local utility grid requirements, selected by the network operator, utility, or authority having jurisdiction.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes recommendations of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61000-4-7:2002, *Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and :instrumentation, for power supply systems and equipment connected thereto*
IEC 61000-4-7:2002/AMD1:2008

IEC TS 61836:2016, *Solar photovoltaic energy systems – Terms, definitions and symbols*

IEC TS 62910:2020, *Utility-interconnected photovoltaic inverters – Test procedure for under voltage ride-through measurements*

IEC TS 63106-2, *Simulators used for testing of photovoltaic power conversion equipment – recommendations – Part 2: DC power simulators*

IEC TS 63217:–[1], *Utility-interconnected photovoltaic (PV) inverters – Test procedure of high-voltage ride-through measurements*

[1] Under preparation. Stage at the time of publication: ACD.